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ABSTRACT

A multi-purpose, multi-user evaluation system was designed to improve the quality of the reporting of information gathered in testing and evaluation practices. One part of the system, the reporting system for information resulting from a district standardized testing program, was described. The Student-Problem Package software was modified to handle special skill reporting features and labelling. Data were obtained from 5,945 students (scores on the Science Research Associates Survey of Basic Skills Test) and 303 teachers in grades K-12. With scoring keys, item response data, and school identification information, a scored vector was obtained of responses for each student. Respective skill scores were then created using test blueprints outlining the items which were used to measure each objective. Creation of the Student-Problem skill profile and the categorized individual skill profile were described, and an example of each was given. The use of overall classroom, school, and district skill proficiency summaries, which can also be generated by the system, was discussed. Four pages of references are given. (MGD)

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A MULTILEVEL EVALUATION SYSTEM USING STUDENT-PROBLEM CHARTS

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A Multilevel-Evaluation System Using Student-Problem Charts

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The purpose of this paper is to describe the development of a multi-purpose, multi-user evaluation system designed to facilitate educational decision-making. The primary focus of this paper is on describing the development of skill profiles using the advancement of the Student-Problem (S-P) Theory.

BACKGROUND

Evaluation and testing can contribute significantly to educational quality and to planning and decision-making at all levels of the educational enterprise: from the individual student through the classroom, school, district, state, and federal levels. Tests, when they are sensitive to individual differences and preferences in learning styles, provide a powerful means for diagnosing students' unique needs and providing effective instruction for all students. Tests, when they match classroom instruction, can provide fair and equitable measures of student progress, measures which focus on learning accomplishments rather than background characteristics. Achievement measures as well as measures of educational processes can help to identify areas where the needs of particular groups are being met and where more

attention is needed, facilitating more effective programs for all.

Testing and evaluation should serve the needs of a multiplicity of users. Drawing on accumulated knowledge about what makes school effective (Harnisch, in press), about what makes evaluation information useful to teachers and administrators (Cooley, 1984; Kean, 1983), the system was developed to supply comprehensive information on an ongoing basis to support policy making by district decision-makers while simultaneously meeting the information needs of teachers and administrators at the local school level.

Measurement of the school outcomes often raises both philosophical and technical problems touching on relevant issues related to the purpose of schooling. School effectiveness studies have typically not concerned themselves with disagreements over the objectives of schools. For example, little discussion of the vocational and nonvocational goals of schooling is given along with minimal discussion of the balance between cognitive material and social skill development. The majority of the studies have focused on the cognitive development because of the relative ease in measuring this outcome and also since these factors tend to be the most important for the parents and the public. However, the complaints of schooling are such that when the children leave them they are unable to read or write very well.

The examination of school effects and associated cognitive

developments have relied primarily on standardized norm-referenced achievement tests. Previous research (Coleman, Campbell, Hobson, McPartland, Mood, Weinfeld and York, 1966; Smith, 1972; Cohen, 1972; Mayeske, Cohen, Wisler, Okada, Beaton, Proshek, Weinfeld, and Tabler (1972) relied primarily on verbal ability tests or composite scores based on a factor analysis of numerous standardized tests of ability and attainment. However, recently investigators have questioned the suitability of standardized achievement tests in measuring the content and skills that schools strive to teach (Madaus, Kellaghan, Rakow, King, 1979; Kellaghan, Madaus, and Airasian, 1982).

Amidst all the debate about testing (misconceptions and limitations, misuses, and abuses) we may ask whether standardized tests provide teachers and counselors with information that is helpful in teaching and in guidance. To what extent does test information contribute to the improvement of a student's learning and the enhancement of his or her self-concept and motivation? Are teachers who do not receive test summaries on the children in a classroom at a disadvantage in their work in comparison with those who have? Furthermore, to what extent are the students at a disadvantage if their teacher does not have the kind of information that is summarized in standardized testing situations?

A major role in all standardized testing programs is played by the teacher. Generally, the teacher does administer tests and receives the results of their pupils' performances. Teachers

have the opportunity to communicate test information directly to students or parents. A major factor in getting test information used and interpreted correctly rests with the teacher. The use of test information has the potential for producing effects on students' self-confidence, self-concept, or academic achievement.

The results from the Kellaghan, et al (1982) study regarding the effects of testing on teachers provides evidence that increased exposure to testing and test results affected teacher's uses of tests. Very little change was noted overall in the attitudes and uses expressed by teachers when compared over a three year time period. On one hand the teachers seemed to like the tests and perceived a number of advantages as being associated with them. On the other, it is reported that the availability of norm-referenced tests and information did not substantially affect teachers' reported practices over a wide range of areas involving testing and evaluation.

The Kellaghan et al. study (1982) showed that standardized testing tends to be used to support, rather than to disrupt, existing school and teacher practices. The most powerful input to teachers regarding test information was found in reports which provided diagnostic information on pupil achievement in addition to norm-referenced information. It was also found that tests having a number of objectives which are spread over the school year to be superior to a criterion-referenced test given for a limited number of objectives.

One approach that can be taken in organizing student and item data is that provided by the S-P theory (Sato, 1975). Harnisch (1983) has given a review of the basic properties of the S-P approach along with some practical applications for use at the classroom level with the basic elements of students (S) and problems (P) used to generate structured S-P charts and their associated caution indices. Considerable research on S-P theory has been undertaken by several researchers and reported on the various applications and linkages to Item Response Theory (Birenbaum, 1984; Harnisch 1983, 1984, 1985; Harnisch & Linn, 1981, 1982; Harnisch & Tatsuoka, 1983; Miller, 1981, 1986; Sato, 1980, 1982, 1985; Tatsuoka & Linn, 1984).

Given the research background on test information that seems to be the most powerful for the reporting function, we set out to develop these elements in a reporting system. In the time remaining, we will focus on only one part of the evaluation system: the reporting system for information resulting from a district standardized testing program. We will outline the procedures taken in creating the displays that yielded the most critical information requested by various groups as resources for possible review of student performance, and curriculum strengths and weaknesses.

S-P SKILL PROFILE SOFTWARE

Modifications were made to the Student-Problem Package (Harnisch, Torres, & Kuo, 1983) software system to handle the

special skill reporting features and labelling, as outlined below. The Student-Problem Package is a system of FORTRAN subroutines easily accessed with a series of control cards much like a typical run for a statistical job in which you specify the format for reading in your data and then manipulate the remaining parameters of the four major S-P subroutines. The system is presently running on either a CYBER 175 or an IBM 43xx environment. The Student-Problem Package for the PC is available which does the individual test and item analysis according to the S-P theory (Harnisch & Romy, 1985). The feature described in this paper is not yet implemented on the PC version.

DATA SOURCE

The data used in this paper is based on data from 5,945 students and 303 classroom teachers. The students are from a midwestern K-12 district with a standardized testing program. The Science Research Associates Survey of Basic Skills Test (SRA) was administered in the spring of 1986 and the technical information on the items was used to create the cut points for the skill/objective distributions. Results from the 1986 test administration were used to create the respective skill profiles. Administrators and the school board have each been informed regarding these new developments and the use of this new approach for reporting skill profiles. Each group saw great potential for this approach in summarizing the strengths of the students in an ordered and understandable manner.

What is required for the development of S-P charts are item response data for a group of students, together with and school ID information. By comparison of the item responses to the respective scoring keys you are able to create a scored vector of responses for each student. To create the respective skill scores, one has to refer to the test blueprint which outlines the items which are used to measure each objective. Based on the items associated with each objective area, (see Figure 1 for a listing of the skill legend used in the example below) skill scores are created by summing up the number of items answered correctly.

Skill score distributions for the normed population are estimated from the information which summarizes the item difficulty and correlation. These estimated skill distributions can be interpreted from a normative perspective since they are based directly on the technical information summarized on the normative sample. To represent the skill performance at three levels we cut the skill distributions at the 30th and 70th percentile to give us the bottom and upper 30 percent of the sample in the extremes and the middle with the remaining 40 percent. This was done for each of the skill distributions for each student in the data base so that in addition to the raw scores for each objective/skill, we have also the trichotomized skill score level recorded as Low performance (L; lower 30 percentile), Middle performance (M; middle 40 percent), and High (upper 30 percentile) performance.

DEVELOPMENT OF S-P SKILL PROFILE

The S-P skill profile is designed to be of great utility for the classroom teacher. The S-P skill profile can provide the teacher with a wealth of information regarding the proficiency patterns of his students. To create the S-P skill profile for a classroom one needs to have the skill proficiency levels for this group of students. Next, we order the students based on the number of skills that have been answered with a high performance level. To illustrate this on the chart, we have given the sign of '+' to represent the high performance on a particular skill, while symbols of 'L' and 'M' were used to represent the skills that the student scored at a low or middle proficiency level, respectively. We are basically scoring the skill a value of 1 if the student has high performance versus a value of 0 if the proficiency level is not high. As a result his total skill score represents the number of skills that were at a high proficiency level. The features of the S-P skill profile chart in which the S- and P-curves are outlined is given in Figure 2.

The S-curve provides a visual display of the proficiency level of the students in the classroom. The S-P skill profile ranks the students from the one who received the most high scores (+), to the one who received the fewest. The skills are ranked from left to right, the easiest skills for this classroom (those on which the most student scored high) to the hardest skills (those on which the fewest students scored high). Note that for

this classroom, skills 18 and 31 (read vertically) are tied for being the easiest and skill 6 is the hardest. At the bottom of this chart is the total number of students scoring high for each skill (again read vertically). Thirteen students scored high on skill 18 and 31. Note also that the first student, Sue, scored high on 30 skills. She had a proficiency level of medium for skill 29 and low for skill 10.

The S's on the S-P skill profiles are placed on each line after the number of skills that the student would be expected to score high on based on the total skill score. For example, Donna has a skill raw score of 3 and the S on her line is after the third easiest skill. The S-curve is then created by drawing vertical lines through the S's and connecting them. A vertical S-curve represent a homogeneous classroom based on these assessed skills, where a diagonal S-curve is evidence of a heterogeneous classroom performance on the test. (A heterogeneous classroom performance is one in which a few students score high and low and the majority are in the middle.) An S-curve shifted to the right shows a high proficiency level in the classroom.

The P-curve is created by placing a P in each column at the point that matches the number of student scoring high on that skill. Then the P's are connected with horizontal lines to form the P-curve. In an ideal classroom (one in which everything tested is taught and learned) the S- and P-curves would coincide. It is quite common to have the S and P curves diverge a little from each other. The individual differences commonly observed

in the classroom provide less than consistent response patterns which force the divergence between these S- and P-curves. A disparity index can be computed which qualifies the level of divergence (Harnisch, 1983). If the test is measuring skills not covered in the classroom, the divergence will be increased. A large divergence between the S- and P-curves signals a possible mismatch of test objectives and instructional objectives in the classroom.

EXAMPLE OF S-P SKILL PROFILE

The first column of the S-P skill chart given in Figure 3 contains the students' names; the second is the raw score, i.e., the number of skills on which each scored high. The third column is the percent of the skills that the student scored high on. For example, the first student, Sue, scored high on 30/32 or .94, or 94% of the assessed skills. The fourth column is the modified caution index (MCI). This index is described in detail in Harnisch and Linn (1981). Its properties are that it ranges from 0 to 1 where a value of 1 represents a response pattern totally inconsistent with the expected pattern while a value of 0 represents a pattern consistent with the expected performance. As a result, the larger the MCI values the greater the alarm that the response pattern is indicating a major departure from an expected pattern. Typically, an MCI index of .30 or less means that the student's proficiency pattern on the skills is in a pattern consistent with the rest of the class. An indicator

greater than .30 means the student has an inconsistent proficiency pattern on the skills, and this total skill score should be considered with caution. For example, look at the fourth student, Carol. Most of the highs are on the easiest skills for this class, and mediums on the skills that are more difficult for this class, and her MCI is .14. Now look at Robert (with a raw score of 15). His pattern of highs, mediums and lows are interspersed, and his MCI is .36. He is answering correctly many of the items in skills his classmates are finding difficult (for example, those questions grouped under skill 25) and yet missing problems in skills his classmates on the whole find easy (skills 3 and 4).

The fifth column is the modified caution sign (MCS). This is an aid for quickly picking out those students with unusual skill patterns. An 'A' signifies above expected performance skill level (scoring high on greater than 30% of the skills) and a consistent skill proficiency pattern ($MCI \leq .30$). A 'B' signifies an adequate total skill score but an inconsistent skill proficiency pattern ($MCI > .30$). For example, Robert has high scores all along the continuum. He did well on skills 24, 29, and 5 when most other did not, yet he did poorly on skills 16 and 26, relatively easy ones for the rest of the class. Possible causes of 'B' classification could be poor study habits, illness during the time the skill was covered in class, carelessness, or a common misunderstanding on a particular skill. A 'C' signifies a low total skill score (less than 30% of skills with high

values) and a consistent skill proficiency pattern ($MCI \leq .30$). For example, Sandra scored high on only 28% of the skills, but most of those were skills that rest of the class also found easy (skill 25 was the exception), so her MCI was .26. A 'D' signifies a low total skill score (less than 30% of skills with high values) and an inconsistent skill proficiency pattern ($MCI > .30$). For example, Lillian received a high on three skills with a high value on skills 29 and 10, skills that were very difficult for most of the students in this class. She may have test anxiety, been ill on the day of testing, have poor test-taking strategies, a short attention span, or possibly the test has found a couple of her hidden strengths, certainly something a teacher would want to probe.

CATEGORIZED INDIVIDUAL SKILL PROFILE

The categorized individual skill profile, as given in Figure 4, allows the evaluation of performance to be based on the ordering of content domains first and then by the objectives within each of the major content domains. An example of a Categorized Individual Skill Profile is given in Table 2 for the same data as was shown in the previous table. The content domains are ranked left to right from easiest to hardest. This is done using the average percent of the class that score high on each content domain, as seen at the bottom of each content domain area. At the bottom of Figure 4 is a legend of the content domain and the abbreviations used. For example, math computation

(MCP) is the easiest content area for the class, and language mechanics (LM) is the hardest. For MCP, 57.4% of the class scored high on its three skills combined. Within each content domain, the skills are ordered easiest to hardest.

The information in the categorized skill profile chart has important summary test information of use by the classroom teacher. For example, the content domains which have averages greater than 30% can be considered a strength since they are based against an expected percentage of 30% scoring high in an area. At the student level, one can identify the content areas that students have unusual strength/weaknesses relative to the expected performance. For example, Diana has an unusual strength in math problem solving as noted by her +++M pattern while being relatively weak in reference materials as noted by her LLLL pattern.

EVALUATION OF S-P REPORTING FORMATS

A series of interviews with teachers were conducted regarding the development of S-P charts as a means of providing useful and improvement-oriented information for decision-making at the classroom, school, and district levels. The results from a series of case studies with groups of teachers has revealed the high value that classroom teachers place on having such organized profiles for their use in evaluation of their instructional coverage and students's strengths and weaknesses. Over 90% of the teachers requested these profiles for the opening of the

school year, based on the spring testing information, to aid them with instructional planning purposes in anticipation of the students' skill levels.

SKILL PROFILE SUMMARIES

Summary of the skill proficiencies over all classrooms and schools is provided to the school board and each administrator regarding district performance. An example of this display is given in Figure 5. The percentage of students scoring at three levels (low, average and high) is summarized for each skill at the district level for each student grade level. These displays were requested as a means for more information on how well are the students doing relative to national standards of performance. When greater than 30% of the sample are in either the lower or upper categories, you have the case in which the expectations were exceeded. An example would be when 55% of the sample were scoring high in one skill level while showing in another skill area that 50% of the students were scoring in the low level. These numbers would reflect in one case a topic in which 25% more of the sample scored higher than we would have expected while in the other category an area where 20% more were scoring low than we would have expected. These summary displays could be used with various groups that need such aggregated information. Typically, we prepare a series of these displays for the administrators in the district and also for the staff at the various school sites in the district. The discussion surrounding

these displays has been very informative. A feature of this S-P evaluation system is that it provides information based on student performance at the skill level that is readily summarized for various uses at the classroom, school, or district level. Our primary dissemination has been through interactive presentations and informal conversations with the participants. This latter step was as important as trying to figure what information was needed for the development of this reporting system.

CONCLUSION

This research was designed to improve the quality of the reporting of information gathered in testing and evaluation practices. Findings from this research activity assist us in better targeting our efforts in the direction of the utilization of research and evaluation data. Questions relative to 'what's happening?' have now been replaced by questions asking 'what do we do now?'. These efforts represent an approach to deal with questions relating uses of test information to improve educational management and instruction.

The results from the implementation of the S-P reporting system allow for the development of a comprehensive information system which provides information to users at multiple levels. The system also provides considerable flexibility in meeting the requirements of reporting for various audiences.

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Figure 1. Skill Number Legend

STUDENT-PROBLEM (S-P) CHART ANALYSIS OF 1986 SRA SKILLS FOR GRADE 1111
SCHOOL CODE = KING GEORGE ; CLASSROOM CODE = M.SMITH
NUMBER OF STUDENTS = 18; NUMBER OF SKILLS = 32

SKILL NUMBER LEGEND

LANGUAGE AND READING

VOCABULARY

- 1. SYNONYMS
- 2. NONLITERAL MEANINGS
- 3. ANTONYMS

READING COMPREHENSION

- 4. LITERAL
- 5. GLOBAL
- 6. INFERENTIAL
- 7. ANALYTICAL

LANGUAGE MECHANICS

- 8. PUNCTUATION
- 9. CAPITALIZATION

LANGUAGE USAGE

- 10. NOUNS AND PRONOUNS
- 11. VERBS
- 12. MODIFIERS AND CONJUNCTIONS
- 13. WRITING SKILLS

SPELLING

- 14. VOWELS AND CONSONANTS
- 15. AFFIXES
- 16. COMMON ERRORS

MATH

COMPUTATION

- 17. WHOLE NUMBERS AND MONEY
- 18. DECIMALS
- 19. FRACTIONS AND MIXED NUMBERS

CONCEPTS

- 20. WHOLE NUMBERS AND MONEY
- 21. FRACTIONS
- 22. DECIMALS

GEOMETRY AND MEASUREMENT

PROBLEM SOLVING

- 24. ONE STEP: WHOLE NUMBERS/MONEY
- 25. ONE STEP: FRACTIONS/DECIMALS
- 26. MULTIPLE STEP PROBLEMS
- 27. GEOMETRY, MEASUREMENT, STATISTICS
- 28. PROBLEM SOLVING SKILLS

REFERENCE MATERIALS

- 29. RESEARCH SKILLS
 - 30. DICTIONARY SKILLS
 - 31. PARTS OF A BOOK
 - 32. MAPS AND TABLES
-

Figure 2. S-P Skill Profile Chart

STUDENT-PROBLEM (S-P) CHART ANALYSIS OF 1986 SRA SKILLS FOR GRADE 1111
 SCHOOL CODE = KING GEORGE ; CLASSROOM CODE = M.SMITH
 NUMBER OF STUDENTS = 18; NUMBER OF SKILLS = 32

STUDENT	SKILL SCORE (RAW) (%)	MODIFIED CAUTION IND/SON	SKILL NUMBER																														
			1	3	1	3	1	3	1	3	1	3	1	3	1	3	1	3	1	3	1	3	1	3	1	3	1	3	1	3	1	3	
SUE	30 94	.24 A	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
ANDREW	28 88	.17 A	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
DOUG	27 84	.19 A	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
CAROL	23 72	.14 A	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
MARK	21 66	.20 A	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
DEBBIE	18 56	.22 A	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
HAROLD	18 56	.19 A	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
DAVE	18 56	.10 A	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
ROBERT	15 47	.36 B	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
JERRY	12 38	.35 B	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
DORIE	12 38	.29 A	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
MARY	11 34	.22 A	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
FRED	11 34	.19 A	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
DIANA	10 31	.25 A	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
SANDRA	9 28	.26 C	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
LILLIAN	3 9	.50 D	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
DONNA	3 9	.30 C	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
MIKE	0 0	.00 C	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
SKILL TOTAL			3	3	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1

S curve

P curve

Figure 3. Illustrated S-P Skill Profile Chart

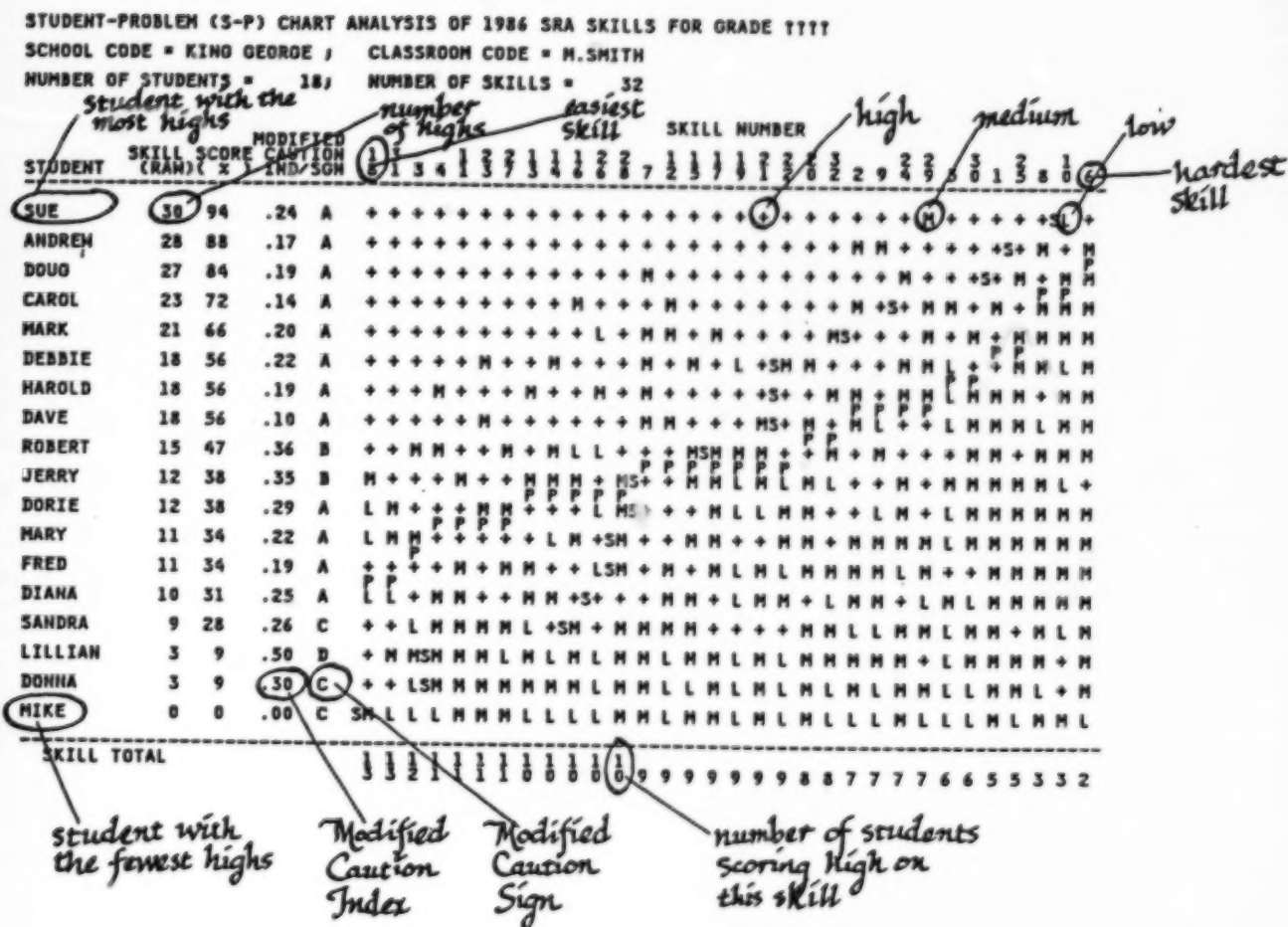


Figure 4. Illustrated Categorized Individual Skill Profile

CATEGORIZED INDIVIDUAL SKILL PROFILE OF 1986 SRA SKILLS FOR GRADE 1111

SCHOOL CODE = KING GEORGE ; CLASSROOM CODE = M.SMITH

NUMBER OF STUDENTS = 18; NUMBER OF SKILLS = 32

STUDENT	SKILL SCORE (RAW) (%)		MODIFIED IND/SGN	CAUTION	SKILL NUMBER									
					1111	1111	2222	2222	2222	3323	3323	4444	4444	4444
					879	463	3120	76843	1290	1620	321	4756	98	
					MCP	SPL	MCH	CONTENT	DOMAIN	LU	VOC	RCP	LW	
SUE	30	94	.24	A	+++	+++	++++	+++++	+++++	+++L	+++	++++	++	
ANDREW	28	88	.17	A	+++	+++	++++	+++++	+++++	++++	+++M	+++M	MM	
DOUG	27	84	.19	A	+++	+++	++++	++++M	++++	+++M	+++	+++M	++	
CAROL	23	72	.14	A	+++	+++	++++	+++++	+++M	+++M	+++M	+++M	++	
MARK	21	66	.20	A	+++	+++	++++	+++M	+++M	+++M	+++	+++M	++	
DEBBIE	18	56	.22	A	+++	+++	++++	+++M	+++M	+++L	+++	+++M	++	
HAROLD	18	56	.19	A	+++	+++	++++	+++M	+++M	+++M	+++M	+++M	++	
DAVE	18	56	.10	A	+++	+++	++++	+++M	+++M	+++M	+++M	+++M	LL	
ROBERT	15	47	.36	B	+++	+++	++++	+++M	+++M	+++M	+++M	+++M	MM	
JERRY	12	38	.35	B	+++	+++	++++	+++M	+++M	+++L	+++	+++M	++	
DORIE	12	38	.29	A	+++	+++	++++	+++M	+++M	+++M	+++M	+++M	LM	
MARY	11	34	.22	A	+++	+++	++++	+++M	+++M	+++M	+++M	+++M	MM	
FRED	11	34	.19	A	+++	+++	++++	+++M	+++M	+++M	+++M	+++M	MM	
DIANA	10	31	.25	A	+++	+++	++++	+++M	+++M	+++M	+++M	+++M	MM	
SANDRA	9	28	.26	C	+++	+++	++++	+++M	+++M	+++M	+++M	+++M	LM	
LILLIAN	3	9	.50	D	+++	+++	++++	+++M	+++M	+++M	+++M	+++M	MM	
DONNA	3	9	.30	C	+++	+++	++++	+++M	+++M	+++M	+++M	+++M	LL	
MIKE	0	0	0.00	C	+++	+++	++++	+++M	+++M	+++M	+++M	+++M	LM	
TOTAL SCORING HIGH ON SKILL					199	11009	1998	110075	13876	11093	1275	1962	73	
AVERAGE PERCENT - DOMAIN					67.5	53.7	51.4	47.8	47.2	45.8	44.4	38.9	27.8	

earliest content domain

skill 10: hardest skill in this content domain

hardest content domain

unexpected strength

relatively weak area

lower than would be expected (should be 230%)

LEGEND VOC = VOCABULARY, LM = LANGUAGE MECHANICS, SPL = SPELLING, MCN = MATH CONCEPTS, RM = REFERENCE MATERIALS, RCP = READING COMPRE, LU = LANGUAGE USAGE, MCP = MATH COMPUTATION, MPS = MATH PROBLEM SOLVING

thirteen students scored high on skill 18

% of class scoring high in this content domain

**Figure 5. Percentage of Students Scoring
Low, Average, or High on
Assessed Skills**

Based on SRA Achievement Test, spring 1986. Percentage of students scoring in the low, average, and high ranges for each skill.

